

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY


(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 11343P5 WO/JM		FOR FURTHER ACTION See Form PCT/PEA/416	
International application No. PCT/GB2004/004637	International filing date (day/month/year) 04.11.2004	Priority date (day/month/year) 14.11.2003	
International Patent Classification (IPC) or national classification and IPC A01M13/00, A01N53/00			
Applicant RECKITT BENCKISER (AUSTRALIA) PTY LIMITED			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 5 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)), containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input checked="" type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 12.09.2005		Date of completion of this report 01.03.2006	
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**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/GB2004/004637

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3) .
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-23	as originally filed
24	received on 12.09.2005 with letter of 09.09.2005

Claims, Numbers

1-31	filed with telefax on 24.01.2006
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- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify):*
 - ☐ any table(s) related to sequence listing *(specify):*
 4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify):*
 - ☐ any table(s) related to sequence listing *(specify):*

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/GB2004/004637

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-31
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-31
Industrial applicability (IA)	Yes: Claims	1-31
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

Re Item I

Basis of the report

The documents mentioned herein are numbered in accordance with the order they appear in the International Search Report.

The amendments filed by the Applicant on the 09.09.2005 and on the 24.01.2006 comply with Article 34(2)(b) PCT insofar as they do not introduce any subject-matter which extends beyond the application as originally filed. They are thus admissible. The amendments consist in making clear which data of Table 5 (page 24) are obtained from the indicated information source, respectively in replacing the wording "comprising" by "consisting essentially of" in some claims. It should be noted that the latter has no effect whatsoever on the scope of the amended claims since the replacing wording has no objective limitation.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The present invention relates to combustible material containing bifenthrin as active ingredients for killing mosquitoes, specifically to a coil or a stick.

It is assumed that all claims enjoy priority rights from the filing date of the priority document. If it later turns out that this is not correct, the document D1 (see Item VI below) could become relevant in the national/regional phase to assess whether claims 1-31 satisfy the criteria set forth in Article 33 PCT.

None of the documents D2-D4 disclose combustible material for dispensing bifenthrin. Novelty is thus acknowledged (Art.33(2)PCT).

The subject-matter of the present claims has 2 relevant aspects to be evaluated for assessing inventive step (Art.33(3)PCT): the fact that bifenthrin is used in mosquito coils instead of the classical volatile pyrethroids and the formulation parameters.

Having regard to the use of bifenthrin, the applicant submitted that the use of a non volatile

pyrethroid in general was not disclosed at the relevant date and that bifenthrin would not have been considered for combustible materials since it decomposes at 170°C.

D2 mentions some pyrethroids for use in smoke fumigants, e.g. cypermethrin, permethrin and deltamethrin, which the applicant acknowledged as non volatile. D3 discloses the possible simultaneous use of such non volatile pyrethroids and even of bifenthrin. D4 describes the use of bifenthrin for fumigation. The fact that D4 uses higher concentrations of bifenthrin is not relevant for the question of thermal stability. D4, Table 1 discloses clearly that 90% of the bifenthrin used in the combustible product is recovered from smoke. One skilled in the art would understand from D4 that, in spite of a known decomposition at 170°C, bifenthrin can be used with minimal loss of activity in combustible insecticides.

The present invention distinguishes from D4 in that the composition is used in a coil rather than in a fumigator. Whereas the former are usually used in the presence of humans and the latter in their absence, the toxicity requirements with respect to humans are obviously different. Moreover, the toxicity requirement with respect to insects are different as well, since fumigation is a massive treatment when compared to the use of a coil. Furthermore, the present invention distinguishes from the usual coils in that the active ingredient kills the insects rather than knocking them down. D3 mentions bifenthrin and coils, but not together. The active ingredient of D3 may be used in coils or other dispensing devices and with bifenthrin or other active ingredients. D3 does not specifically teach that bifenthrin is suitable in coils. There was no incentive to replace the active of e.g. D3 with bifenthrin nor was there any incentive to make coils out of compositions used in fumigators with a reasonable expectation of success.

The present application thus fulfills the criteria of Article 33(3) PCT, because the claimed subject-matter involves any inventive step (Rule 65(1) and (2) PCT).

Re Item VI

Certain documents cited

Certain published documents

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
WO 2004/031104	15.04.2004	02.10.2003	02.10.2002

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/GB2004/004637

CLAIMS:

1. A combustible coil or stick for controlling mosquitoes, the coil or stick consisting essentially of a substrate and an insecticidally effective amount of bifenthrin, wherein
5 an oxygen supplier or accelerant is included in the coil or stick in an amount of from 0 - 1% w/w and the bifenthrin is present in an amount of about 0.002 - 0.6 % w/w, such that upon combustion of the coil or stick the bifenthrin is released at a rate of about 0.02 mg/h - 12 mg/h to control mosquitoes.
2. A combustible coil or stick for controlling mosquitoes, the coil or stick consisting
10 essentially of an insecticidally effective amount of bifenthrin in an amount of about 0.002 - 0.6 % w/w and a substrate that includes an oxygen supplier or accelerant in an amount of from 0 - 1% w/w, wherein the coil or stick is adapted to permit release of the bifenthrin from the coil or stick at a rate of about 0.02 mg/h-12 mg/h upon combustion of the coil or stick.
- 15 3. The combustible coil or stick according to claim 1 or 2 wherein the mosquitoes are controlled by killing.
4. The combustible coil or stick according to any one of claims 1-3 wherein the bifenthrin is released from the coil or stick at a rate of about 0.12 mg/h-3.75 mg/h.
5. The combustible coil or stick according to any one of claims 1-3 wherein the
20 bifenthrin is released from the coil or stick at a rate of about 0.3 mg/h-1.5 mg/h.
6. The combustible coil or stick according to any one of claims 1-5 wherein the bifenthrin is present in an amount of about 0.008-0.25 %w/w.
7. The combustible coil or stick according to any one of claims 1-5 wherein the bifenthrin is present in an amount of about 0.02-0.1 % w/w
- 25 8. The combustible coil or stick according to any one of claims 1-7 wherein the coil or stick has a weight of approximately 2-4 g.
9. The combustible coil or stick according to any one of claims 1-7 wherein the coil or stick has a weight of approximately 4-8 g.
10. The combustible coil or stick according to any one of claims 1-7 wherein the coil
30 or stick has a weight of approximately 8-16 g.
11. The combustible coil or stick according to any one of claims 1-7 wherein the coil or stick has a weight of approximately 10-20 g.
12. The combustible coil or stick according to any one of claims 1-7 wherein the coil or stick has a weight of approximately 12-24 g.
- 35 13. A combustible coil or stick for killing mosquitoes consisting essentially of a substrate and an insecticidally effective amount of bifenthrin , wherein an oxygen

supplier or accelerant is included in an amount of from 0 - 1% w/w and the bifenthrin is present in an amount of about 0.02-0.1% w/w, such that upon combustion of the coil or stick the bifenthrin is released at a rate of about 0.3 mg/h-1.5 mg/h to kill mosquitoes.

14. A combustible coil or stick for killing mosquitoes, the coil or stick consisting essentially of an insecticidally effective amount of bifenthrin in an amount of about 0.02 - 0.1% w/w and a substrate that includes an oxygen supplier or accelerant in an amount of from 0 - 1% w/w, wherein the coil or stick is adapted to permit release of the bifenthrin from the coil or stick at a rate of about 0.3 - 1.5 mg/h upon combustion of the coil or stick.
15. The combustible coil or stick according to any one of claims 1-14, wherein the substrate comprises a combustible fuel and a binder agent.
16. The combustible coil or stick according to claim 15 wherein the combustible fuel is selected from one or more of the group consisting of wood, sawdust, cardboard, coconut shell, leaves, nutshells, jute, sugarcane bagass, rice husks, tea and coffee refuse.
17. The combustible coil according to claim 15 or 16 wherein the binder agent is selected from one or more of the group consisting of starch, tamarind starch, tamarind kernal powder, guar gum and gum (joss) powder.
18. The combustible coil according to any one of claims 15-17 wherein the substrate further comprises one or more additives selected from the group consisting of emulsifying agents, retardants, preservatives, colouring agents and perfumes.
19. A combustible coil or stick for controlling mosquitoes consisting of:
 - 50-95%w/w combustible fuel material;
 - 5-40%w/w binding agent;
 - 0-1%w/w preservative;
 - 0-1%w/w oxygen supplier or accelerant;
 - 0-5%w/w retardant;
 - 0-5%w/w colouring agent;
 - 0-1%w/w perfume;
 - 0-1%w/w emulsifying agent;
 - 0.002-0.6%w/w bifenthrin.
20. A combustible coil or stick for controlling mosquitoes consisting of:
 - 35-40%w/w coconut shell;
 - 25-50%w/w wood powder;
 - 0.5-15%w/w gum (joss) powder;
 - 0-20%w/w tapioca starch;

0-0.5%w/w sodium benzoate;
0-1%w/w potassium nitrate;
0-1%w/w colouring agent;
0-1%w/w perfume;
5 0-10%w/w guar gum;
0-20%w/w tamarind starch;
0.008-2.6%w/w bifenthrin EC (23.34% bifenthrin).

21. A method for controlling mosquitoes, the method comprising burning a coil or stick according to any one of claims 1-20 so as to allow the bifenthrin to release from
10 the coil or stick into the atmosphere at a rate of 0.02 mg/h - 12 mg/h to control mosquitoes.

22 The method according to claim 21 wherein the bifenthrin releases from the coil or stick at a rate of about 0.12 mg/h - 3.75 mg/h.

23. The method according to claim 21 wherein the bifenthrin releases from the coil or
15 stick at a rate of about 0.3 mg/h - 1.5 mg/h.

24. A method of producing a combustible coil or stick according to any one of claims 1-20, the method comprising the steps of: a) providing a substrate that includes 0 - 1% w/w oxygen supplier or accelerant; b) combining an insecticidally effective amount of bifenthrin with the substrate; and c) shaping the substrate; wherein the substrate is
20 shaped before or after the addition of bifenthrin.

25. The method according to claim 24 wherein the method comprises the steps of:

a) combining one or more combustible fuels, one or more binder agents and optionally one or more preservatives to form a dry mix;

b) combining an insecticidally effective amount of bifenthrin with an
25 emulsifying agent to form an emulsified bifenthrin concentrate;

c) forming a dispersion of emulsified bifenthrin in water;

d) adding the dispersion of emulsified bifenthrin to the dry mix with mixing to form a dough;

e) shaping the dough into coils or sticks; and

30 f) drying the coils or sticks.

26. A method of producing a combustible stick according to any one of claims 1-20, the method comprising the steps of: a) providing a stick adapted to received a substrate; b) providing a substrate that includes 0 - 1% w/w oxygen supplier or accelerant; c) combining an insecticidally effective amount of bifenthrin with the substrate; and d)
35 applying the substrate to the stick; wherein the substrate is applied to the stick before or after the addition of bifenthrin.

27. The method according to claim 26, the method comprising the steps of:
- a) providing a stick and optionally coating the stick with an adhesive agent;
 - b) providing a substrate comprising a combustible fuel material and binding agent;
 - 5 c) applying the substrate to the stick by rolling the stick in the substrate; rolling thin sheets of the substrate around the stick; or extruding or moulding the substrate around the stick;
 - d) dipping the stick in or spraying the stick with a solution containing bifenthrin and optionally perfume.
- 10 28. The method according to claim 27 wherein the adhesive agent is gum or glue.
29. Use of an insecticidally effective amount of bifenthrin in a combustible coil or stick for controlling mosquitoes, wherein the coil or stick includes 0 - 1% w/w oxygen supplier or accelerant and 0.002-0.6% w/w of bifenthrin is impregnated within and/or coated onto the coil or stick.
- 15 30. The method of any one of claims 24 - 28 or the use according to claim 29 wherein the bifenthrin is present in an amount of about 0.008 - 0.25 %w/w.
31. The method of any one of claims 24 - 28 or the use according to claim 29 wherein the bifenthrin is present in an amount of about 0.02 - 0.1 % w/w.

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Table 5 - Comparison of physical properties of bifenthrin with other pyrethroids

(Source of data relating to vapour pressure, melting point, boiling point and molecular weight: The Pesticide Manual, A World Compendium. 12th Ed. Editor C.D.S. Tomlin. British Crop Protection Council. The data relating to mortality is experimental data prepared by the inventors.)

	Vapour Pressure (mPa)	Melting Point (°C)	Boiling Point (°C)	Molecular Weight	% mortality of Ae. aegypti (15 mins exposure)
0.25% d-Allethrin	0.16 (21°C)	-	281.5	302.4	7
0.05% Bifenthrin	0.024 (25°C)	68-70.6	Decomp>170	422.9	94
0.228% d-Phenothrin	0.019 (21.4°C)	-	>290	350.5	24
0.035% Imiprothrin	0.0018 (25°C)	-	-	318.4	7
0.705% Permethrin	0.0025 (20°C)	34-35	200	391.3	55
0.3% Cypermethrin	0.0002 (20°C)	61-83	-	416.3	56
0.056% Bioresmethrin	18.6 (25°C)	32	Decomp>180	338.4	23
0.07% Deltamethrin	0.0000124 (25°C)	100-102	-	505.2	12
Blank coil					6
Untreated control					10

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It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

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